26, 27, or to control pressure of the heat-exchange gas so that the gas leak can be limited without trouble.

IN THE CLAIMS

Pease cancel claims 1-14, and add, new claims 15-28, as follows:

15. An electro-static chucking mechanism for chucking an object electro-statically, comprising:

a stage including a dielectric block having a chucking surface with a concave to be closed by the object for chucking thereon, gas introducing channels communicating with the concave, a chucking electrode provided in the dielectric block, a main body fixed to the dielectric block and having a cavity, and a sheet inserted between the main body and dielectric block for enhancing heat transfer therebetween;

a temperature controller attached to the main body to circulate a coolant to the cavity for controlling temperature of the object;

a chucking power supply connected to the chucking electrode to apply voltage thereto to chuck the object;

a gas introduction system connected to the gas introducing channels for introducing heat-exchange gas into said concave to control temperature of the object while increasing pressure in said concave; and

lift pins for receiving and transferring the object, each lift pin being disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concaves only through the gas introducing channels in which the lift pins are provided.

16. An electro-static chucking mechanism as claimed in claim 15, wherein said concave includes heat-exchange concaves for promoting heat-exchange under increased pressure, and a gas-diffusion concave for diffusing the heat-exchange gas to the heat-exchange concaves, said gas-diffusion concave being deeper than the heat-exchange concaves.

17. An electro-static chucking mechanism as claimed in claim 16, wherein said gas-diffusion concave is formed symmetrically with a center of the stage.

18. An electro-static chucking mechanism as claimed in claim 17, wherein each of said heat-exchange concaves has a depth in a range of 1 to 20 μm.

19. An electro-static chucking mechanism as claimed in claim 18, wherein said chucking surface has a contact area to contact with the object in a range of 3 to 20 % relative to a surface area of the object facing the stage.

20. An electro-static chucking mechanism as claimed in claim 19, wherein said gas-diffusion concave has an area on the chucking surface in a range of 5 to 30 % relative to a surface area of the object facing the stage.

21. An electro-static chucking mechanism as claimed in claim 20, wherein said gas-diffusion concave has a depth in the range of 50 to 1,000 μm.

22. A surface processing apparatus, comprising:

a process chamber for receiving an object to be processed therein; and

an electro-static chucking mechanism facing an inner surface of the process chamber for chucking the object electro-statically thereon in the process chamber, said chucking mechanism comprising:

a stage including a dielectric block having a chucking surface with a concave to be closed by the object for chucking thereon, gas introducing channels communicating with the concave, a chucking electrode provided in the dielectric block, a main body fixed to the dielectric block and having a cavity, and a sheet inserted between the main body and dielectric block for enhancing heat transfer therebetween;

a temperature controller attached to the main body to circulate a coolant to the cavity for controlling temperature of the object;

a chucking power supply connected to the chucking electrode to apply voltage thereto to chuck the object;

a gas introduction system connected to the gas introducing channels for introducing heat-exchange gas into said concave to control temperature of the object while increasing pressure in said concave; and

lift pins for receiving and transferring the object, each being disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concaves only through the gas introducing channels in which the lift pins are provided.

23. A surface processing apparatus as claimed in claim 22, wherein said concave includes heat-exchange concaves for promoting heat-exchange under increased pressure, and a gas-diffusion concave for diffusing the heat-exchange gas to the heat-exchange concaves, said gas-diffusion concave being deeper than the heat-exchange concaves.

24. A surface processing apparatus as claimed in claim 23, wherein said gas-diffusion concave is formed symmetrically with a center of the stage.

25. A surface processing apparatus as claimed in claim 24, wherein each of said heat-exchange concaves has a depth in a range of 1 to 20 μm.

26. A surface processing apparatus as claimed in claim 25, wherein said chucking surface has a contact area to contact with the object in a range of 3 to 20 % relative to a surface area of the object facing the stage.

27. A surface processing apparatus as claimed in claim 26, wherein said gas-diffusion concave has a cross-sectional area along the chucking surface in a range of 5 to 30 % relative to a surface area of the object facing the stage.